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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/733,280	12/08/2000	Masaki Hara	09792909-4724	3148

7590

06/10/2003

SONNENSCHN NATH & ROSENTHAL

80th Floor-Sears Tower

233 S. Wacker Drive

Chicago, IL 60606

EXAMINER

TRAN, BINH X

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 06/10/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/733,280

Applicant(s)

HARA, MASAKI

Examiner

Binh X Tran

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 March 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 10-17 and 20-40 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-3, 5-8, 10-16 and 33-40 is/are allowed.
- 6) ☒ Claim(s) 17, 20-23 and 26-32 is/are rejected.
- 7) ☒ Claim(s) 4 and 24-25 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Double Patenting

1. Claim 7 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 4. Claim 23 is objected to under 37 CFR 1.75 as being a substantial duplicate of claim 20. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Interpretation

2. In claim 21, the examiner interprets the entity has multiple surfaces. Further the applicants do not define what constitute as "the other surface". Therefore the examiner reserves a right to interpret any surfaces on the entity as "the other surface".

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 17, 20-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Ikeda et al. (US 6,441,451).

Ikeda discloses a method to make a through hole comprising:

performing a dry etching to form a through hole (Fig 1f-1h or Fig 2f-2h or Fig 3f-3h) under the condition where a conductor (110 or 210) is in contact with the silicon semiconductor wafer (100 or 200) at least near a location for making a through hole.

Ikeda further disclose the "the substrate 200 made of monocrystalline silicon material ... first conductor layer 210 made of metal having a higher electricity conductivity" (col. 9 lines 48-51).

Respect to claim 20, 23 Ikeda discloses the conductor is metal (col. 9 lines 48-51). Respect to claims 21-22, Ikeda discloses the conductor is film formed on the entire surface or a location of the silicon wafer near the region for making the through hole (Fig 1-2).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda in view of Lin et al. (US 6,483,147).

Respect to claim 26, Ikeda disclose the dry etching is performed using SF₆ (col. 6 lines 46-55). Ikeda fails to disclose the combination of SF₆ and C₄F₈ etchant. In a dry etching method, Lin discloses a one or more etchant comprise SF₆, C₄F₈ (col. 4 lines 35-45). It would have been obvious to one having ordinary skill in the art, at the time of

invention, to modify Ikeda in view of Lin by using SF_6 and C_4F_8 because it is an effective composition for etching silicon layer.

Respect to claims 27-28, Ikeda discloses the dry etching a plasma etching. However, Ikeda fails to disclose the dry etching use ions or the etching is a reactive ion etching (RIE). Lin discloses the plasma etching to create the hole is a reactive ion etching. It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Ikeda in view of Lin by using ions and/or RIE because it is easy to perform and the reactor is commercial available.

7. Claims 29-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ikeda in view of Brosnihan et al. (US 6,121,552).

Ikeda does not explicitly disclose the specific value of the aspect ratio. In a method for forming through hole, Nathan discloses the aspect ratio at 5:1 to 20:1 (read on not smaller than 3 or 5 or 8 or 10; col. 4 lines 17-25). Brosnihan further discloses the aspect ratio is the result effective variable. It would have been obvious to one having ordinary skill in the art, at the time of invention, to modify Ikeda in view of Brosnihan by having the aspect ratio not smaller than 10 because Ikeda is not particular about the specific value of the aspect ratio and therefore any value would produce an expected result. Further, since aspect ratio is a result effective variable and result effective variable is determined by routine experiment. The process of conducting routine optimization experiments so as to produce an expected result is obvious to one of ordinary skill in the art.

Allowable Subject Matter

8. Claims 1-3, 5-8, 10-16, 33-40 are allowed.
9. Claims 24-25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
10. The following is a statement of reasons for the indication of allowable subject matter: The cited prior arts fail to disclose or suggest the through hole is made by setting the conductor with a melting point on a wafer stage in a dry etching apparatus and then maintaining the wafer stage above the melting point of the conductor to melt the conductor and hereunder conducting the dry etching. The closest prior arts teach to etch the hole in the dry etching apparatus. However, the prior arts does not teaches to melt the conductor.

Response to Arguments

11. Applicant's arguments filed 3-13-2003 with respect to claims 1-8, 10-16 are persuasive. Therefore, the examiner decides to withdraw the rejection in previous office action.
12. Applicant's arguments with respect to claims 17, 20-32 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Binh X Tran whose telephone number is (703) 308-1867. The examiner can normally be reached on Monday-Thursday and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin L Utech can be reached on (703) 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Binh X. Tran
June 5, 2003


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700